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Remarks:
This application was filed on 11 - 02 - 2003 as a divisional application to the application mentioned under INID code 62.

(54) Improved vapor - permeable shoe

(57) A vapor-permeable shoe comprising:

a vapor-permeable upper (711);
a tread sole (713);
a mid-sole, which comprises at least one membrane (715) made of waterproof and vapor-permeable material;
a vapor-permeable or perforated insole (717); and
a vapor-permeable or perforated filler layer (719) which is arranged between said insole (717) and said membrane (715);
whereby the tread sole (713) is a composite having a lower tough and waterproof layer (713a) which is in contact with the ground during use and an upper region having a layer (713b) permeable to heat and moisture which faces the membrane (715) upon assembly, and the permeable layer (713b) allowing transpiration through its perimetric edge in contact with the outside.

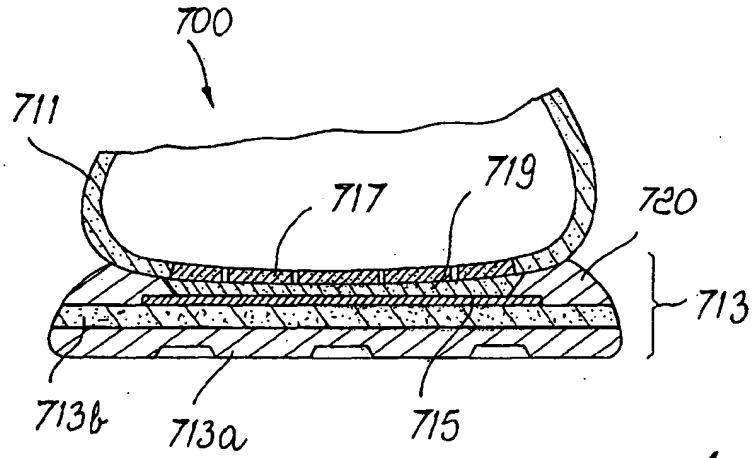

Fig. 1

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Description

Technical Field

[0001] The present invention relates to an improved vapor-permeable shoe.

Background Art

[0002] It is currently known that a shoe, in order to be comfortable, must ensure correct exchange of heat and water vapor between the microclimate inside the shoe and the external microclimate.

[0003] However, such heat and water-vapor exchanges must not compromise in any case the impermeableness of the shoe to external moisture or water.

[0004] In currently commercially available shoes, heat and water-vapor exchanges are substantially entrusted either to the upper portion of the shoe (upper) or to the sole.

[0005] As regards the upper portion of the shoe, shoes which have perforated uppers and/or are provided with linings made of vapor-permeable and waterproof material are currently commercially available.

[0006] Indeed, in some models, part of the upper may be replaced with materials which are indeed waterproof and at the same time vapor-permeable.

[0007] Another category of shoes instead entrusts transpiration to the sole, by using layers of materials which are impermeable to water and are vapor-permeable, optionally associated with protective layers and with fillers.

[0008] In order to achieve optimum exchange of heat and water vapor, a vapor-permeable shoe has been conceived which is disclosed in WO 97/14326 and comprises the following combination of elements:

a vapor-permeable upper associated with a vapor-permeable or perforated lining;
a tread sole made of perforated elastomer;
a mid-sole which comprises at least one membrane made of vapor-permeable waterproof material which is associated with a lower protective layer made of a material resistant to hydrolysis, water-repellent and vapor-permeable or perforated;
a vapor-permeable or perforated insole;
a vapor-permeable or perforated filler layer arranged between the insole and the membrane.

[0009] In the shoe as disclosed in WO 97/14326, the lower part of the upper, the thread sole and the mid-sole with the membrane are perimetrically sealed in their coupling regions. Said shoe has solved the problem of the transpiration of heat and water vapor, but it still entails some marginal drawbacks mostly during manufacture. This is because it is rather difficult to insert the rather delicate waterproof membrane precisely, safely and without damage during the assembly of the mid-sole.

[0010] Moreover, during use, the membrane, especially in shoes used in particularly demanding situations, may be subjected to such stresses as to produce undesirable damage thereto.

Disclosure of the Invention

[0011] The aim of the present invention is to provide a vapor-permeable shoe which combines the possibility of providing heat and water-vapor exchange both through the upper and through the sole, ensuring at all times an optimum internal microclimate as a function of the external climate, with improved simplicity and precision of execution during manufacture.

[0012] Within the scope of this aim, an object of the present invention is to provide a vapor-permeable shoe in which the membrane specifically assigned to the transpiration function is protected effectively even if the shoe is used in situations which are particularly demanding as to mechanical stresses, such as in the field of sports and in the field of working shoes.

[0013] Another object of the present invention is to provide a vapor-permeable shoe which is meant both for day-to-day use and for sports use.

[0014] Another object of the present invention is to provide a vapor-permeable shoe having a competitive cost with respect to conventional vapor-permeable shoes.

[0015] Another object of the present invention is to provide a vapor-permeable shoe which can be manufactured with known technologies.

[0016] In accordance with the invention, there is provided a shoe having: a vapor-permeable upper; a tread sole; a mid-sole, which comprises at least one membrane made of waterproof and vapor-permeable material; a vapor-permeable or perforated insole; and a vapor-permeable or perforated filler layer which is arranged between the insole and the membrane; which is characterized in that the tread sole is a composite having a lower tough and waterproof layer which is in contact with the ground during use and an upper region having a layer permeable to heat and moisture which faces the membrane upon assembly, and the permeable layer allowing transpiration through its perimetric edge in contact with the outside.

Brief description of the Drawings

[0017] Further characteristics and advantages of the vapor-permeable shoe according to the present invention will become apparent from the following detailed description of various embodiments thereof, illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a transverse sectional view of an embodiment of the shoe according to the present invention.

Ways of carrying out the Invention

[0018] With particular reference to Figure 1, a shoe according to the invention is generally designated by the reference numeral 700.

[0019] The shoe 700 comprises an upper 711 which is vapor-permeable (for example made of natural hide without sealing pigments).

[0020] The shoe 700 also comprises a membrane 715 made of vapor-permeable waterproof, Teflon material, such as those commercially available and known by the trade-name Gore-Tex. Alternatively, the vapor-permeable waterproof material may be polyurethane or a polyester commercially available and known by the trade-name Sympatex.

[0021] Membranes used to prepare the vapor-permeable, waterproof material generally have a thickness in the range of 10 to 50 microns. Such membranes are usually sold by the manufacturer as coated large meshed and light "tricots".

[0022] In this embodiment, the shoe 700 is provided with means for protecting the membrane 715, which are constituted by a composite tread sole 713.

[0023] In particular, the tread sole 713 comprises a waterproof layer 713a made of elastomer, which is in contact with the ground, and an internal layer 713b, which is made of microporous and fully permeable material.

[0024] In particular, said layer 713b makes contact with, or in any case faces, the membrane 715, to which it is joined at least in the edge regions (where a seal is provided) by means of an element 720 which joins the entire assembly to the upper 711.

[0025] The layer 713b is fully permeable and thus allows the transpiration of water vapor and heat exchange through its edge regions (the other regions are sealed by the lower layer 713a).

[0026] The shoe has, above the membrane 715 as well, a filler layer 719 which is vapor-permeable or perforated and a vapor-permeable or perforated insole 717.

[0027] The insole 717 is made of vapor-permeable material (for example natural leather) which is perforated and is optionally associable with a heel seat made of soft hide with absorbent rubber latex, not shown. The insole 717 is applied to the upper 711 through the classic system called "lasting", that is through a "cap-like" matching of a spreaded upper to a last, to which an insole is applied with nails in the area of the sole. Then, through stretching and spreading, the perimetric parts of the upper are glued on those of the insole along the entire perimeter of the insole. In this way, the upper takes the shape of the last. The outsole or composite tread sole 713 is then applied.

[0028] It should also be noted that membrane protection is achieved without compromising in any way the vapor-permeability and waterproofing characteristics of the shoe as a whole.

[0029] Attention is also drawn to the flexibility of use of the shoe according to the invention and to the possibility of providing said shoe at costs which are highly competitive with respect to conventional shoes.

[0030] It should also be noted that the shoe according to the invention, thanks to its shape and constructive structure, can also be suitable for high-quality embodiments.

[0031] The present invention is susceptible of modifications and variations, all of which are within the scope of the inventive concept; the materials may also be any according to requirements.

[0032] Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described herein.

[0033] This application claims priority of Italian Application No. PD97A000102 filed May 9, 1997 (WO 98/51177), the entire specification of which is incorporated herein by reference.

Claims

1. A shoe (700) comprising the following combination of elements:

   a vapor-permeable upper (711);
   a tread sole (713);
   a mid-sole, which comprises at least one membrane (715) made of waterproof and vapor-permeable material;
   a vapor-permeable or perforated insole (717);
   a vapor-permeable or perforated filler layer (719) which is arranged between said insole (717) and said membrane (715),

   characterized in that said tread sole (713) is a composite having a lower tough and waterproof layer (713a) which is in contact with the ground during use and an upper region having a layer (713b) permeable to heat and moisture which faces said membrane (715) upon assembly, said permeable layer (713b) allowing transpiration through its perimetric edge in contact with the outside.

2. The shoe of claim 1, **characterized in that** said waterproof layer (713a) is made of elastomer.

3. The shoe of any one or more of the preceding claims, **characterized in that** said internal layer (713b) is made of microporous and fully permeable material allowing the transpiration of water vapor and heat exchange through its edge regions, whereby the other regions being sealed by said lower layer (713a).

4. The shoe of any one or more of the preceding claims, **characterized in that** said layer (713b) makes contact with, or in any case faces, the membrane (715), to which it is joined at least in the edge regions where a seal is provided by means of an element (720) which joins the entire assembly to said upper (711).

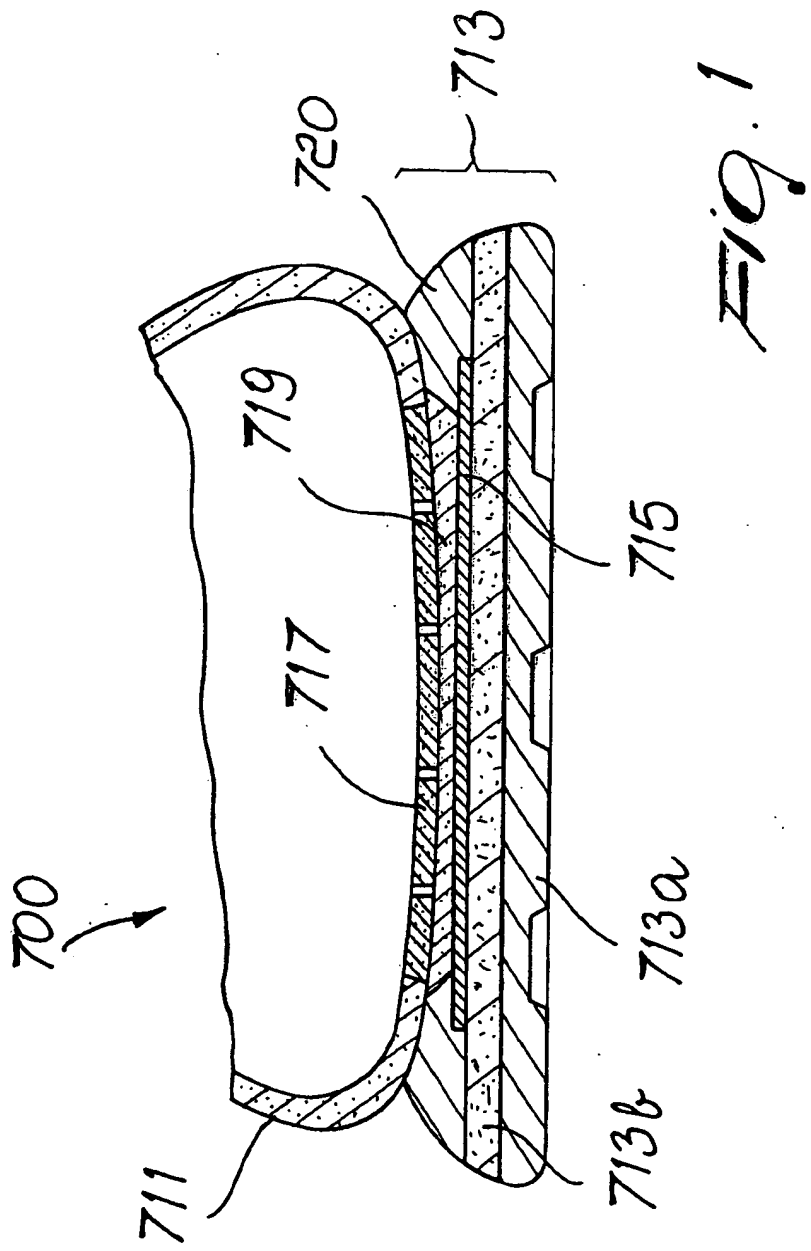

Fig. 1